18 A method as in Claim 16, wherein $D=(1-z^{-1})/T_s{*}I$, where I is the identity matrix of order n, $E=K_1$, $C=K_1$ or $C=K_1+K_2D$ or $C=K_1+K_2D+K_3D^2$ or $C=K_1+K_2D+K_3D^2+K_4D^3$ or $C=K_1+K_2D+K_3D^2+K_4D^3+\ldots+K_mD^{m-1}$, where m is a positive integer, and the coefficients K_1, K_2, ..., K_m are n by n constant matrices and are the said tuning parameters.

19 A method as in Claim 17, wherein $D=(1-z^{-1})/T_s{*}I$, where I is the identity matrix of order n, $E=K_1$, $C=K_1$ or $C=K_1+K_2D$ or $C=K_1+K_2D+K_3D^2$ or $C=K_1+K_2D+K_3D^2+K_4D^3$ or $C=K_1+K_2D+K_3D^2+K_4D^3+\ldots+K_mD^{m-1}$, where m is a positive integer, and the coefficients K_1, K_2, ..., K_m are n by n constant matrices and are the said tuning parameters.

20 A linear controller as in Claim 16 with its structure and tuning parameter determined by Claim 18 and m>3.

21 A linear controller as in Claim 16 with its structure and tuning parameter determined by Claim 19 and m>3.

In Abstract

Please cancel the old abstract and substitute the new abstract as follows:

-- Methods of designing optimal discrete time linear controllers are disclosed. The optimal values of the tuning parameters in a linear controller can be found by minimizing the maximum of absolute values of all poles of the discrete time closed-loop transfer function from the set point to the process variable. This is a minimax problem and can be solved without any difficulty. A constrained optimization can be used to solve this minimax problem in cases where one or more of the tuning parameters are subject to lower limit and/or upper limit constraints. The PID (proportional-integral-derivative) controller tuning problem is thus solved since PID controllers can be considered as special cases of the general linear controller.--